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EXAMINER	
WINTER, GENTLE E	

ART UNIT	PAPER NUMBER
1746	

DATE MAILED: 02/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/815,919	JENSON, MARK L.	
	Examiner	Art Unit	
	Gentle E. Winter	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 Dec 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-78 and 89-115* is/are pending in the application.

4a) Of the above claim(s) *35-64 and 89-100* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34,65-77 and 101-107* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/22/2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-34, 65-78, and 101-107 drawn to a method of fabricating a solid state energy storage device, classified in class 427, subclass 115.

II. Claims 107-115, drawn to an apparatus, classified in class 118, subclass 720.The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus, as claimed, can be used to practice another and materially different process, namely a means for coating ice onto a concrete surface for graffiti removal.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. Group I is elected by original presentation. Claims 108-115 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Drawings

The corrections to the drawing are acceptable.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 25 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim fails to point out what is included or excluded by the claim language. Is there a fourth layer, what meaning should be accorded the designation of "fifth" and "sixth". Stacked layers from the substrate? Layers on the substrate in different areas.

7.

Response to Arguments

Applicant argued that United States Patent No. 4,333,808 to Bhattacharyya et al. (Bhattacharyya) says nothing about an electrolyte, fails to disclose supplying an energized second material different from the first material. Admittedly Bhattacharyya does not use the word "electrolyte" however the term is construed in a manner consistent with what applicant contemplates, namely "the electrolyte film allows ionic transport therethrough and "[i]n some embodiments, the film between the electrodes is a dielectric material", which is disclosed in Bhattacharyya "conductive film is ion implanted using ion beam. It is noted that applicant fails to identify what is intended by electrolyte. Claim 1 discloses depositing a first layer on the substrate by depositing a first material (Bhattacharyya: "deposit metal on substrate") and supplying an energized second material different from the first material towards the substrate (Bhattacharyya: "ion beam implanation") adjacent the location to control growth of the first

material at the location. (Bhattacharyya: "deposit metal oxide on metal"). Applicant does not argue with the examiner that the requisite layers are formed. The arguments are not persuasive and the rejection will be maintained at this time.

With respect to claim 65 applicants argues that Bhattacharyya says nothing about forming a seed film on the substrate and then forming a first film on the seed film by depositing a first material to a location on the seed film and supplying a second material different from the first material to control the growth of a crystalline structure. The same is disclosed at figure 1 and relevant associated text. Specifically, the RF sputtering step. It is not clear if applicant is suggesting that applicant is performing an additional step, over what Bhattacharyya is disclosing, or if applicant is merely suggesting that despite Bhattacharyya performing the identical steps that applicant achieves a different result. If the latter is contemplated, the claim will properly be the subject of a 35 U.S.C. § 112 rejection for failing to disclose an essential step.

Applicants' amendments to the claims changing "first" to --fifth-- is confusing, why is first changed to fifth? Noteworthy, in the claims: there apparently no fourth layer. Is applicant trying to change the scope of the claim by carrying the terms as used in the specification into the claim? Is applicant obliquely stating that five layers are required? If not, what is the purpose of the change? This amendment is not consistent with this examiner's understanding of what constitutes a grammar correction. Additionally, adding the limitation "simultaneously with the deposition of the first material" is not what this examiner considers a grammar correction, but rather a substantive amendment, which necessitates the withdrawal of the Bhattacharyya

reference inasmuch that reference, contemplates sequential steps. The perception is also consistent with what is disclosed in the instant specification: "In *some* embodiments, the energy is supplied simultaneously with the material to be deposited on a substrate." Emphasis added. Finally, claim 101 *does* appear to be a grammar correction.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-7, 10-12, 26, 30, 33, 34, and 65 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 4,333,808 ('808).

2. Claims 1 and 65 are generally drawn to a fabrication method comprising depositing a first layer on a substrate by depositing a first material to a location on the substrate, and supplying an energized second material different than the first material towards the substrate adjacent the location to control growth of the first material at the location and forming an electrolyte second layer on the first layer and forming a third layer on the second layer. The same is disclosed in figure 1 of '808 and figure 2a of the instant invention, which is applicant's admitted prior art.

3. It is noted that he claim language is open. Inherent with the same steps is the crystalline structure. It is noted that the electrolyte second layer on the first layer includes a first material

deposited to a location on the substrate and at least partially in contact with the first layer, and supplying energized ions of a second material different than the first material to the location on the substrate to form the electrolyte second layer. The same is disclosed in figure 3 and relevant associated text, see especially column 5, line 30 *et seq.*

4. Additionally, it is noted that the '808 reference discloses that the supply of the energized second material includes supplying particles of the energized second material along a path that is not coincident with a path along which the first material travels. This is inherent because the energized second material (e.g. O+ or N+) is accomplished with an ion beam; and it is noted that the formation of an energized second material includes supplying energized ions to the location on the substrate disclosed at e.g. column 3, line 50 *et seq.*

5. As to claims 2, disclosing that the first layer is formed with the aid of physical vapor deposition to direct the first material to the location on the substrate. The same is disclosed at e.g. column 4, line 7 *et seq.* (sputter system, not shown). The same is also disclosed in applicant's admitted prior art figure 2a.

6. As to claims 3-7, 11, disclosing that the energized second material includes supplying ions having an energy within the range of about 5 to about 3000 eV and is oxygen, nitrogen, or argon (which is a noble gas) the same is disclosed at e.g. column 4, line 7 *et seq.* and 41 *et seq.*.

7. As to claim 10, further limiting claim 3 and disclosing that the energized ions includes supplying a non-focused beam of the ions. It is noted that both focused and non-focused beams

are disclosed. Because '808 does not specifically address focusing, it is assumed that the beam is "non-focused" if applicant takes the position that the beam is "focused" then claim 9, in lieu of claim 10 will be rejected here.

8. As to claim 12, further limiting claim 3, disclosing that the energized ions of the second material control stoichiometry of a growing film of first material, the same is disclosed at e.g. column 3, line 50 *et seq.* disclosing that the O+ or N+ control the stoichiometry.

9. As to claim 16, disclosing that the substrate includes a first contact layer on the substrate that at least partially separates the first layer from the substrate. The same is disclosed at e.g. col. 3, line 28 *et seq.* disclosing that the metal electrode (13) is placed on the substrate.

10. As to claim 26, disclosing that the third layer on the electrolyte second layer includes a third material deposited to a second location at least partially in contact with the electrolyte second layer and separate from the first layer, and supplying energized ions of a fourth material different than the third material to the second location to control growth of a crystalline structure of the third material at the location to form the third layer. The same is disclosed in figure 3 and relevant associated text, see especially column 5, line 30 *et seq.*

11. As to claim 30, disclosing that the substrate includes a substrate having a thermal degradation temperature of less than 700 degrees Celsius. The disclosed silicon wafer will experience warpage and damage at this temperature. Further, the formed structure would be

damaged. The maximum annealing temperature disclosed is 150-400 Celsius. See e.g. column 4, line 57 *et seq.*

12. As to claim 33, disclosing that the supplying the energized second material includes controlling growth of the first material into a crystalline structure. The same is disclosed at e.g. column 4, line 22 *et seq.* disclosing metal oxide film formed by RF sputtering exhibits regions with crystalline structure. The second beam controls the crystal structure.

13. As to claim 34, disclosing that the energized second material includes supplying energized ions. As indicated above ionized gas is disclosed, see e.g. column 4, line 22 *et seq.* also see figure 1 and relevant associated text.

14. As to claim 66 and 70, disclosing that the third film includes forming a second seed 87lm on a surface of the electrolyte second film and thereafter forming the third film on the second seed film. The same is disclosed at figure 1 and relevant associated text. Specifically, the RF sputtering step.

15. As to claim 67, disclosing that the second seed film includes depositing a seed material having a surface free energy that is higher than a surface free energy of the third film. This is inherent in the post anneal electrode.

16. As to claim 73, disclosing that the seed material has a surface free energy that is higher than a surface free energy of the first film. This is inherent in the metal deposited on the substrate.

17. As to claim 76, disclosing that the seed film includes an electrically conductive seed material. The same is disclosed in figure 1 and relevant associated text see especially first metal deposition step and relevant associated text.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

1. Claims 1, 5, 28, and 29 are rejected under 35 U.S.C. 102(a) as being anticipated *A Study of Electronic Shorting in IBDA-Deposited Lipon Films* by Vereda et al. (Vereda).

2. Vereda discloses a method of fabricating a solid-state energy-storage device (Introduction) including the steps of providing a substrate and depositing a first layer on the substrate: by depositing a first material to a location on the substrate and simultaneously supplying an energized second material, along a path that is not coincident with the path that the first material travels (second paragraph "2.1 Experimental"), wherein the second material

(nitrogen "2.1 Experimental") is different from the first material and travels toward the substrate adjacent the location to control growth of the first material at the location (ion beam directed assembly) the film is an electrolyte second layer on the first layer; and forming a third layer on the second layer ("2.1 Experimental").

Claims 1, 3, 11, and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 4,730,383. (383). discloses a method of fabricating a thin-film battery comprising providing a substrate having a thermal degradation temperature of less than 700 degrees, '383 discloses the substrate as an "integrated circuit" at see e.g. column 3, line 16 *et seq.* thereafter '383 discloses depositing a first electrode material using a deposition source. The '383 discloses this as the deposition of a "metallic substrate". Inherently the supplied particles are energized well above about 5 eV, which is required to overcome most molecular forces and originates with the disclosed "ion gun" disclosed at see e.g. column 4, line 5 *et seq.* The electrode is then covered with a second film grown electrolyte which is formed on the first film electrode. Thereafter a third layer is formed by vapor deposition, and finally a fourth layer "metallic deposit **5** is made on layer **4**."

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 4,333,808 and United States Patent No. 6,086,962 ('962).

19. As to claim 8, further limiting claim 3 and disclosing that the ions are from a source gas including a hydrocarbon precursor. Each and every limitation of claim 8 is identically disclosed in '808 as set forth above, except that '808 fails to explicitly disclose that the ions are from a source gas including a hydrocarbon precursor. As an initial matter, the specification seems vague as to exactly what is intended by "hydrocarbon precursor". Nonetheless, its intended purpose seems clear enough and an artisan apparently would be familiar enough with the term such that no undue experimentation would be required. The '692 reference explicitly provides not only the missing element but also the motivation for making the combination. Specifically, the '692 patent at example F, discloses that "it was determined that the sum of the argon flow and the hydrocarbon precursor gas flow needed to be above approximately 35 sccm for optimal operation of the particular ion source…". See e.g. column 15, line 16 *et seq.* The reason for including a carbon source is disclosed in both the '808 and '962 patents, namely to alter chemistry of the impacted layer i.e. for an oxide layer use oxygen, for a nitride layer use nitrogen, for a carbide layer use carbon.

20. As to claim 9, further limiting claim 3, and disclosing that the energized ions includes focused beam the ions at the location on the substrate. The same is disclosed at in the '962 patent. Specifically, a magnetic field is disclosed to be formed across the anode discharge region and in electrons ionizing the plasma maintenance gases and forming a plasma beam of gas ions

throughout the anode discharge region. The artisan would have been motivated to use a focused beam in an effort to reduce the load on the vacuum pump and/or to limit the effects of the beam to a certain region. Additionally, form time to time the artisan will want to treat an entire substrate to as to impart a characteristic over the entire substrate.

21. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 4,333,808 and United States Patent No. 6,086,962 ('962).
Paragraphs 69 and 70 provide the missing elements and explicitly provide the motivation for making the instant combination. The artisan would have been motivated to make the instant combination disclosing that laminate induced substrate stresses can be controlled and decreased by increasing the ion energy the deposition process to a range of from about 200-1,000 eV. The reference goes on to state that in one embodiment the energy is: "preferably from about 100-150 eV, and most preferably from about 100-140 eV) per carbon ion. At these energies, films 7 (i.e. layer 3 in the FIG. 2 embodiment) emulate diamond." In a larger sense, the values recited amount to little more than a results dependant variable, well within the grasp of one of ordinary skill in the relevant art.

22. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 4,333,808 and United States Patent No. 6,203,944 ('944).
As to claim 18 disclosing that at least one of: depositing the first film; forming the electrolyte second film; or forming the third film, includes using chemical vapor deposition to direct the primary material toward the substrate. As an initial matter, CVD is well known in the art as a

deposition technique. In support of this proposition United States Patent No. 6,203,944 see e.g. column 5, line 60 *et seq.* disclosing:

> The electrode compositions may be prepared in the form of thin films or powders according to a variety of methods. Examples include sputtering, **chemical vapor deposition**, vacuum evaporation, melt spinning, splat cooling, spray atomization, and ball milling. The choice of technique determines whether the electrode composition is prepared in the form of a thin film or a powder. Sputtering, for example, produces the electrode composition in the form of a thin film, whereas ball milling produces the electrode composition in the form of a free flowing powder which can then be combined with, e.g., a polymeric binder to form an electrode suitable for incorporation in a battery.

23. The missing element is thus disclosed in the '944. The artisan would have been motivated to make the instant combination because dielectric materials are usually deposited using chemical vapor deposition (CVD) or PECVD. Sputter type depositions optimally coat all exposed surfaces, while evaporator depositions coat surfaces facing the evaporation source.

24. As to claim 19, disclosing that the first layer includes depositing an intercalation material in the first layer to have a crystal orientation essentially perpendicular to a boundary between the first layer and the second layer. Each and every limitation of claim 19 is disclosed in '808 as set forth above, except that '808 fails to explicitly disclose depositing an intercalation material in the first layer to have a crystal orientation essentially perpendicular to a boundary between the first layer and the second layer. The same is disclosed in the '944 patent at e.g. column see e.g. column 1, line 1 *et seq.* disclosing that graphite and carbon which are intercalated with lithium generally exhibit good cycle life and coulombic efficiency, with relatively low capacity. The artisan would have been motivated to combine the '944 patent with the '808 patent when seeking good cycle life and coulombic efficiency where capacity is not critical. Because the same steps are disclosed the same product inherently would result.

25. Claims 19-24, 27, and 75 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 4,333,808 and United States Patent No. 6,576,369.
As to claims 19-23, disclosing that depositing the first layer includes depositing an intercalation material in the first layer to have a crystal orientation essentially perpendicular to a boundary between the first layer and the second layer, wherein the intercalation first layer has a crystallite size of about 240 Angstroms. The art is with replete with teaching of various crystallite sizes. The '369 patent teaches the disclosed range and the reason behind altering the range. Specifically, the '369 patent teaches that if the crystallite size is less than 100 Angstroms, the crystallite is so small as to introduce a significant disturbance into the crystal lattices, and it does not allow lithium ions entering through the open interstices to be efficiently received therein. On the other hand, in order to achieve a crystallite size exceeding 2000 Angstroms a damaging prolonged heat treatment is required. The crystallite size is more preferably in the range of 500 to 1500 Angstroms. See e.g. column 8, line 14 et seq. Elsewhere the crystallite has a reported diameter of 100 to 2000 Angstroms (20010051300).

26. With specific respect to claim 23, further limiting claim 22, and disclosing that the intercalation first layer includes depositing a LiCoO2 material as the first layer. The same is disclosed at e.g. column 26, line 8 *et seq.*

27. As to claim 24, further limiting claim 23, disclosing that the LiCoO2 intercalation first layer includes depositing the LiCoO2 intercalation first layer as a cathode layer (positive

electrode). The same is disclosed at e.g. column 26, line 8 *et seq.* Disclosing that a positive electrode **2** produced from LiCoO2.

28. As to claim 27, further limiting claim 26, disclosing that the third layer includes an anode for a thin-film battery. The same is disclosed in *inter alia* the Abstract of the '369 reference. The artisan would have been motivated to include an anode in the indicated manner for ease of fabrication and for the reasons disclosed in '369 *i.e.* a simpler manufacturing procedure. Additionally the same is believed to be inherent in the '808 reference.

29. Claims 17, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 4,333,808 and United States Patent No. 5,567,210.

30. Claim 17, further limits claim 16, and discloses that the substrate includes a second contact layer on the substrate separate from the first contact layer. The same is apparently not disclosed in '808 but is disclosed in disclosed in figure 1 of '875. The artisan would have been motivated to make the instant combination for the reason set forth in '210, namely that the battery can be "fabricated directly onto a semiconductor chip, onto the semiconductor die or onto any portion of the chip carrier." Additionally, such a design allows for the fabrication simplification, inasmuch as the electrodes may be deposited contemporaneously.

31. As to claims 31 and 32, disclosing that the substrate a thermal degradation temperature of less than about 250 degrees Celsius. This is inherently present in the '210 reference, as the

semiconductor chip would be damaged at temperatures below 250 Celsius, especially if maintained at this temperature for extended periods of time.

32. Claims 68, 69, and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 4,333,808 and United States Patent No. 5,705,293.

33. As to claim 68, further limiting claim 66, disclosing that the third film includes a lithium intercalation material, and wherein forming the second seed film includes depositing an amorphous seed material to diminish undesirable growth structures of a lithium intercalation material of the third film. Each and every limitation of claim 68 is disclosed in '808 as set forth above, except that '808 fails to explicitly disclose that the second seed layer, includes depositing an amorphous seed material. The missing element is supplied in the '293 reference. The artisan would have been motivated to make the instant combination in an attempt to maximize surface area and corresponding charge storage. See e.g. column 5, line 5

34. As to claim 69, further limiting claim 66, disclosing that the third film includes a lithium intercalation material, and wherein forming the second seed film includes depositing a nanocrystalline seed material with fine grains to diminish undesirable growth structures of the lithium intercalation material of the third film. The '808 reference fails to teach the lithium intercalation material, the '293 discloses a solid-state, thin-film Li battery that is constructed in the anode/electrolyte/cathode geometry. The anode is disclosed to include Lithium. see e.g. column 5, line 5. Inherently the growth structures of the lithium intercalation material of the

third film will be suppressed or diminished. The artisan would have been motivated to make the instant combination because Li intercalation compounds are the most commonly used, and are especially stable in thin film battery applications.

35. As to claim 74, disclosing that the first film includes a lithium intercalation material, and wherein forming the seed film includes depositing an amorphous seed material to diminish undesirable growth structures of the lithium intercalation material of the first film. It is not clear if the lithium intercalation is being deposited on the substrate or on a metal/conductive layer that was previously deposited. Consistent with the specification it is assume that the intercalation layer is deposited on a conductive seed layer. The same is disclosed in the '293 patent, the motivation for making the combination is as indicated above.

36. Claims 71, and 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 4,333,808 and United States Patent No. 6,475,854.

37. As to claims 71 and 77 wherein the deposited seed material includes TaN. While the TaN seed layer is not explicitly disclosed, but is believed to be inherent with the addition of the N+ ion stream, which would seemingly create a tantalum nitride layer. However, since the same is not disclosed the '854 reference has been provided to supply the missing element. The artisan would have been motivated to use TaN for the reason set forth in '808 namely good capacitance and low leakage especially in humid or hot conditions.

38. Claims 101-107 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 4,333,808 and United States Patent No. 6,056,857.

39. With respect to claim 101 drawn to a method comprising providing a substrate depositing a first layer on the substrate by depositing a first material to a location on the substrate, and supplying energized particles of a second material different than the first material to the substrate adjacent the location to control growth of a crystalline structure of the first material at the location; forming an electrolyte second layer on the first layer; and forming a third layer on the electrolyte second layer, after performing the above steps, cryogenically annealing the energy-storage device. Each and every limitation of claim 101 is disclosed in '808 as set forth above, except that 808 fails to disclose a cryogenic annealing step. The cryogenic annealing step is disclosed in the '857 reference as is the motivation for making the instant combination. The '857 reference relates to a method for cryogenically annealing to provide a uniformly dense molecular structure. The artisan would have been motivated to make the instant combination for the reasons explicitly set forth in '857, namely grain size reduction and improved uniformity.

40. As to claim 102, disclosing wherein supplying energized particles includes supplying energized ions, the same is disclosed in '808.

41. As to claim 103 disclosing that the cryogenically annealing includes exposing the energy-storage device to liquid nitrogen vapor. It is assumed that applicant means cold liquid nitrogen vapor. Liquids are not usually considered to be vapors. The '857 reference discloses that a

liquefied gas is selected from a group including nitrogen. The artisan would pick LN2 because it is inexpensive, and the most commonly available cryogenic fluid.

42. As to claim 104, further limiting claim 102 and disclosing that the cryogenically annealing includes lowering the temperature of the energy-storage device to a near cryogenic temperature, then raising the temperature to a near deposition temperature, and then cooling the energy-storage device to an ambient temperature. The same is identically disclosed in '857. The reasons for making the combination are the same as those disclosed in '857, namely deposition processing.

43. As to claim 105, and 106 further limiting claim 104, raising, and cooling steps are repeated less than six times. The steps are disclosed to be repeated once n the '857 patent. The motivation would be the facilitation of multiple processing steps, where each step may undergo a treatment step at or above the ambient, such as particle deposition, followed by cryogenic annealing of the deposited layer.

44. As to claim 107, further limiting claim 73, and disclosing packaging the device prior to cryogenically annealing. In the '857 reference the material is packaged prior to annealing. The artisan would have been motivated to anneal in any order that is functional. In this case, there could be an intermediate packaging step, or the device could be exposed to a subsequent processing step. Additionally, the annealing could serve a dual role as a cryogenic cleaning/annealing step, or potentially simply a cleaning step that inherently anneals.

Conclusion

45. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

46. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

47. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gentle E. Winter whose telephone number is (703) 305-3403. The examiner can normally be reached on Monday-Friday 7:00-3:30.

48. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on (703) 308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Gentle E. Winter
Examiner
Art Unit 1746

February 10, 2004

RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700